Derivation of hESC Lines with Disease Lesions

Grant Award Details

Derivation of hESC Lines with Disease Lesions

Grant Type: New Cell Lines

Grant Number: RL1-00630

Project Objective: The objective was to derive hESC lines from PGD diagnosed embryos.

Investigator:

Name:	Julie Baker
Institution:	Stanford University
Type:	PI

Disease Focus: Genetic Disorder

Human Stem Cell Use: Embryonic Stem Cell

Cell Line Generation: Embryonic Stem Cell

Award Value: $1,404,725

Status: Closed

Progress Reports

Reporting Period: Year 1

View Report

Reporting Period: Year 2

View Report

Reporting Period: Year 3

View Report

Reporting Period: Year 4 (NCE)

View Report

Grant Application Details

Application Title: Derivation of hESC Lines with Disease Lesions

Public Abstract: The inner workings of the nervous system which regulate normal body movements, thought processes, feelings and senses are highly complex. How the nervous system relays and receives this variety of information is little understood, although significant inroads are being made to deduce underlying causes of many forms of neurological disorders. Many forms of retardation are caused directly by a failure of the cells within the nervous system to survive or work properly. One of the biggest limitations in this research is the inability to study the disease in the laboratory over the course of the disease. This is because neuronal or brain cells cannot be examined experimentally and ethically until postmortem tissues are obtained. Human embryonic stem cells (hESCs) can differentiate in the laboratory into many of the neural tissues within the human brain and spinal cord. Thus, they are a key to exploring human neurogenesis in vitro. In this proposal, we explore yet another vital use of hESCs, which is to study how neurogenesis is effected in vitro with cells carrying mutations that cause different forms of neurological dysfunction. To date, most of the hESC field has been devoted to deriving purified adult tissues for eventual transplantation therapies. Many hurdles remain, including methods to purify tissues, adequate means to avoid tumorigenesis, immunorejection, and transplantation. While using hESCs for regenerative purposes is the great hope of stem cell biology, the creation of disease specific hESCs is a more tangible and immediate means to both understanding disease and developing drugs to treat disease without having the tremendous cost and hurdles that remain for transplantation therapies. Thus, we argue that a vast and immediate effort should be placed upon the development of hESC lines with specific disease mutations that can be tested in vitro. In this grant we will develop more than 15 new hESC lines that carry mutations that cause neurological disease in children. Our goal is to develop, characterize and distribute hESCs as models for Hurlers Syndrome, Fragile X, Tay Sachs, and Canavan Syndrome so that researchers can study these diseases in the laboratory and test drugs to alleviate them.

Statement of Benefit to California: Our goal is to develop human embryonic stem cells that carry mutations that cause neurological diseases in children, including Canavans, Hurler, Tay Sachs, Fragile X and Adrenoleukodystrophy. hESCs can differentiate into neural cell types which means that these lines would provide a valuable tool to study the mechanisms underlying these debilitating diseases and would provide a critical method for drug testing to alleviate the disease symptoms. There is no doubt the development of these hESCs as a tool to understand neurological diseases would benefit the citizens of California, both emotionally and financially.